

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-009478

(43)Date of publication of application : 11.01.2002

(51)Int.Cl.

H05K 9/00

(21)Application number : 2000-182620

(71)Applicant : KEIHIN CORP

(22)Date of filing : 19.06.2000

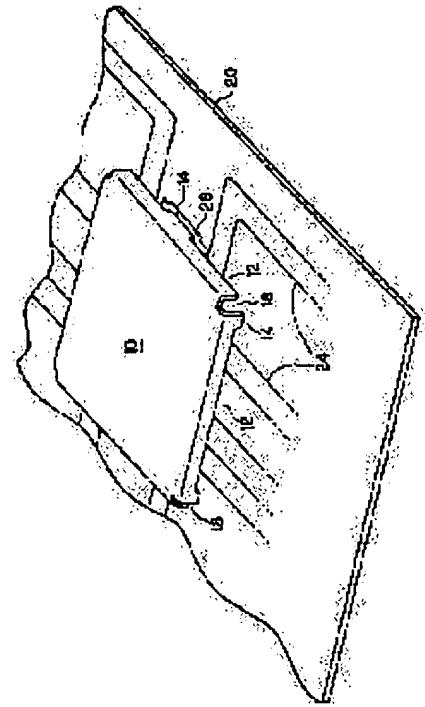
(72)Inventor : KITAMURA NORIYUKI
KIKUCHI SATOSHI

(54) ELECTRONIC UNIT WITH ELECTROMAGNETIC WAVE SHIELD PLATE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an electromagnetic wave shield plate which neither interferes with board wirings, nor reduces the mounting area of an electronic circuit board but enables filling of resin into inner spaces, and prevent damage to the electronic circuit board surface contacting the electromagnetic wave shield plate to improve the reliability and the mount density of an electronic unit having the electromagnetic wave shield plate.

SOLUTION: Spaces 12 are formed into the side wall lower end of an electromagnetic wave shield plate 10 according to a pattern 24 of an electronic circuit board 20, slits 18 of a specified width enough to flow resin in are formed from the top end to the lower end of the side wall, legs 14 for supporting the shield plate 10 are formed at desired positions on the side wall lower end, and a silk print 28 is formed (printed) on the electronic circuit board surface contacting the shield plate 10.



LEGAL STATUS

[Date of request for examination] 13.03.2001

[Date of sending the examiner's decision of rejection] 10.02.2004

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

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CLAIMS

[Claim(s)]

[Claim 1] In the electronic unit equipped with the electronic-circuitry substrate carrying the electromagnetic wave shielding plate which shields the electromagnetic wave sent out from electronic parts and said electronic parts Form the slit section in the wall surface of said electromagnetic wave shielding plate, and the foot linked to said electronic-circuitry substrate is formed in the lower limit of said wall surface. Furthermore, the electronic unit which equipped the perimeter of the connection which said foot connects with the electromagnetic wave shielding plate characterized by performing silk printing while forming the gap section which the part except said foot is cut and lacked [section] and passes the circuit pattern of said electronic-circuitry substrate.

[Claim 2] Said connection is the electronic unit equipped with the electromagnetic wave shielding plate given in claim 1 term characterized by being the through hole where said foot is inserted.

[Claim 3] Said connection is the electronic unit equipped with the electromagnetic wave shielding plate given in claim 1 term characterized by being the pad with which said foot is mounted.

[Claim 4] The electronic unit which equipped with the electromagnetic wave shielding plate of a publication at least either of claim 1 term to the 3rd term characterized by becoming the input for making said resin flow into the interior of said electromagnetic wave shielding plate when [of said slit section and the gap section] either carried out the mold of said electronic-circuitry substrate in one with resin.

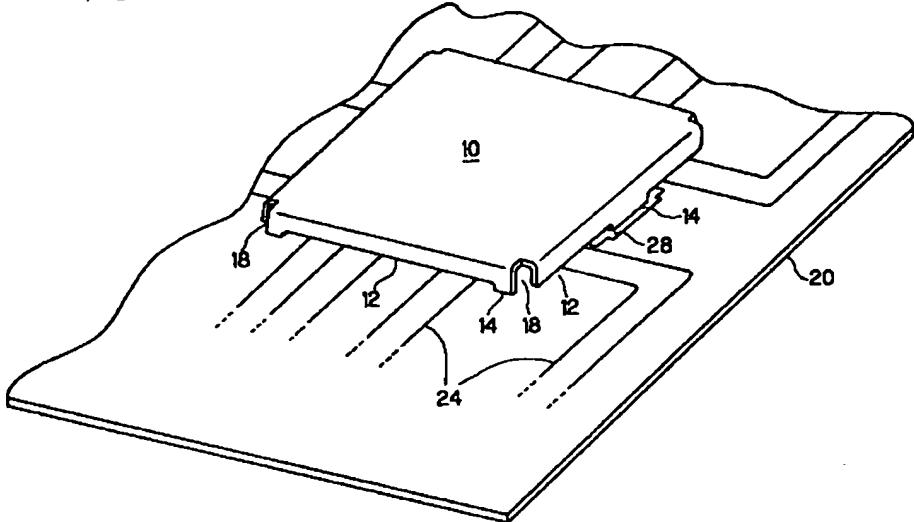
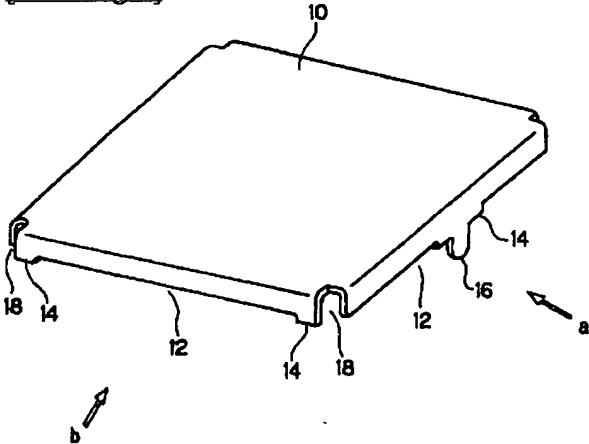
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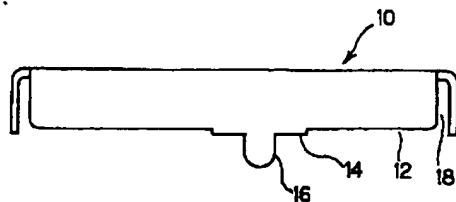
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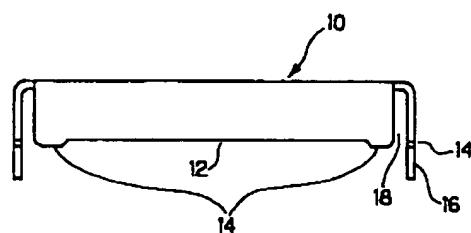
DRAWINGS

[Drawing 1]**[Drawing 2]****[Drawing 3]**

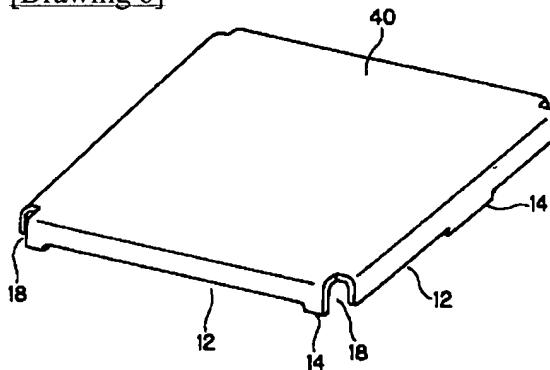
(a)



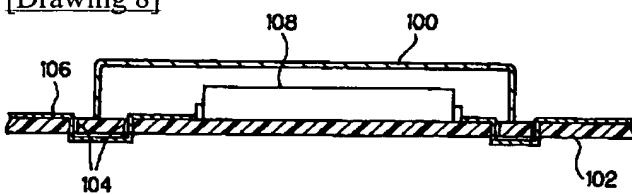
(b)



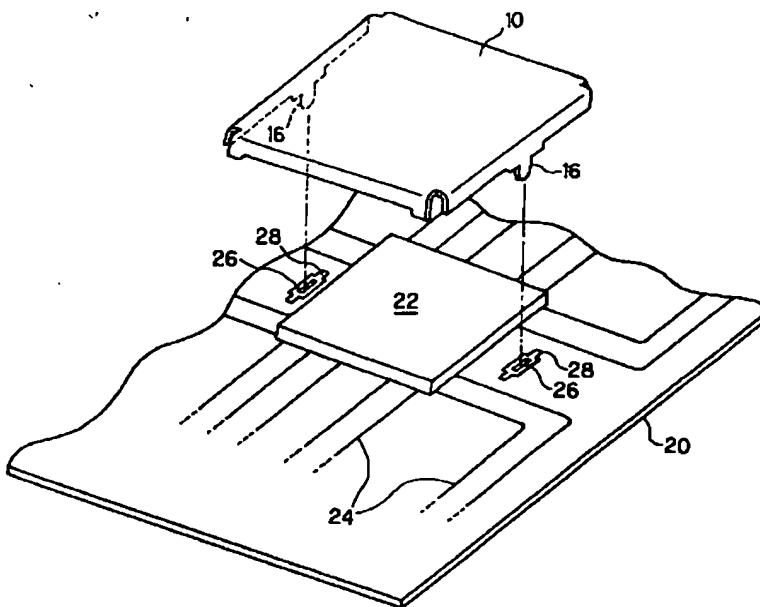
[Drawing 6]



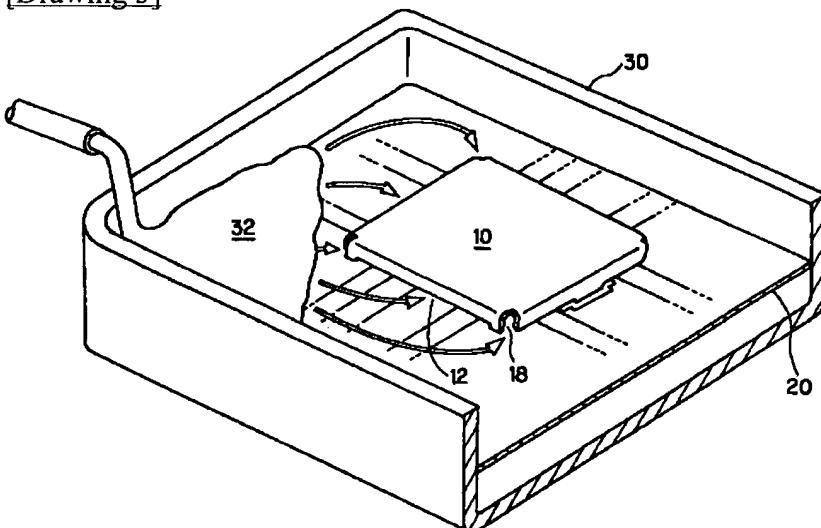
[Drawing 8]



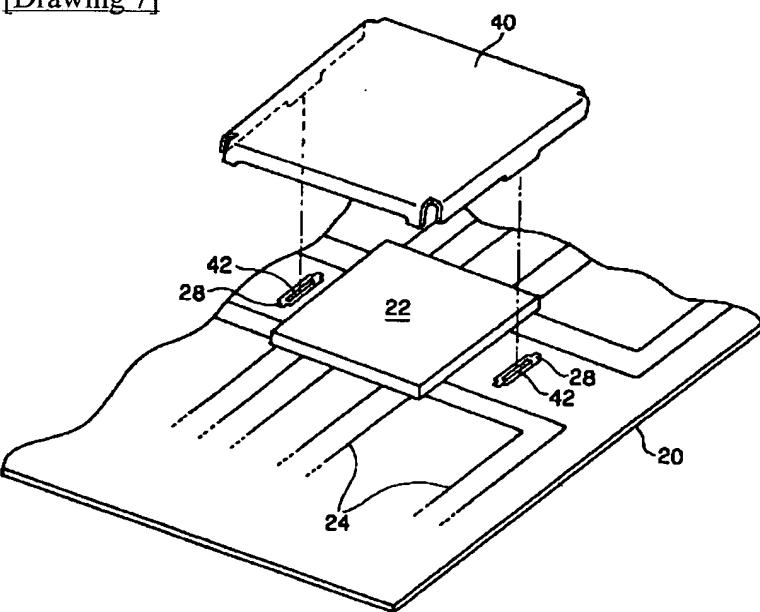
[Drawing 4]



[Drawing 5]



[Drawing 7]



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the electronic unit specifically equipped with the substrate carrying electronic parts, and the shielding plate which shields the electromagnetic wave sent out from said electronic parts about the electronic unit equipped with the electromagnetic wave shielding plate.

[0002]

[Description of the Prior Art] From electronic parts, such as CPU carried in the substrate, although the electromagnetic wave of a certain specific frequency is sent out, other electronic parts carried in the substrate depending on the frequency may be affected. For this reason, the metal electromagnetic wave shielding plate which shields an electromagnetic wave (electric shielding) is used.

[0003] The perimeter of the electronic parts of electromagnetic wave sending-out origin, and since all of a top face and a side face were specifically covered, the conventional electromagnetic wave shielding plate might be cut, if the wall surface lower limit of the pattern on a substrate (circuit pattern) and an electromagnetic wave shielding plate interfered, and the pattern was damaged or having been forced. Therefore, as shown in drawing 8, in the way and the method of outside, the through hole 104 by which plating processing was carried out was drilled in the substrate 102, respectively among the electromagnetic wave shielding plates 100, and damage and cutting of a pattern are prevented from making the rear face of a substrate 102 bypass a pattern 106 through the through hole 104.

[0004] Moreover, when used under the environment where vibration resistance and waterproofness are required, it is [that the lead section and the solder section of electronic parts should be protected from generating of the solder crack by vibration, lead section fracture, the short circuit by moisture, etc.] desirable to carry out the mold of a substrate and the electronic parts in one with resin. However, as mentioned above, since the conventional electromagnetic wave shielding plate had covered all the perimeters of the electronic parts of electromagnetic wave sending-out origin, it did not fill up with resin to the building envelope of a shielding plate, but when the residual air of the building envelope of a shielding plate produced moisture by change of atmospheric temperature and an atmospheric pressure etc., therefore, it had a possibility of oxidizing the lead section of electronic parts.

[0005] Therefore, being filled up with resin in the space which restoration of resin drilled the through tube in difficult space at the substrate, and described above through the through tube like the technique indicated by JP,9-266382,A, for example from the substrate lower part is performed.

[0006]

[Problem(s) to be Solved by the Invention] While receiving great constraint in the helicopter loading site of the electronic parts inside an electromagnetic wave shielding plate, or the design of a pattern since the through hole needed to be drilled when making the rear face of a substrate bypass a pattern, in order to prevent damage and cutting of a pattern like the above, there was a problem that the component-side product of a substrate fell.

[0007] Furthermore, also when a through tube was drilled in the space at a substrate so that restoration of resin may be filled up with resin in difficult space, the same problem arose.

[0008] Moreover, since the fluidity of the air of the building envelope of an electromagnetic wave shielding plate was bad, it tends to be filled with heat, namely, there was fault that heat dissipation nature was bad.

[0009] Moreover, an electromagnetic wave shielding plate is usually carried by insertion mounting or the surface mount on an electronic-circuitry substrate (connection). Since the foot (lead section as used in the field of electronic parts) prepared in the electromagnetic wave shielding plate is inserted in the through hole drilled by the electronic-circuitry substrate when insertion mounting is carried out, it can certainly carry, without causing a location gap. On the other hand, while the part where an electromagnetic wave shielding plate and an electronic-circuitry substrate contact

soon was generated, as mentioned above, since an electromagnetic wave shielding plate was metal, it had the fault of damaging the electronic-circuitry substrate front face which contacts an electromagnetic wave shielding plate by vibration etc.

[0010] Moreover, when considering as a surface mount, while being able to raise the packaging density of an electronic-circuitry substrate, neither a foot nor a through hole can be needed, but it can certainly carry with a simpler configuration. Furthermore, dependability (reinforcement) reservation of a foot etc. can become unnecessary and can raise the dependability of an electronic unit.

[0011] On the other hand, although the surface mount was performed by arranging and carrying out a reflow of the pad with which cream solder was applied to the contact side of an electromagnetic wave shielding plate and an electronic-circuitry substrate, when a reflow was carried out, there was a possibility that a solder bridge might be formed between an electromagnetic wave shielding plate and the pattern near the pad. The electromagnetic wave shielding plate and the pattern were electrically connected through solder, and, specifically, there was fear, such as causing a short circuit.

[0012] Therefore, while the purpose of this invention does not interfere with the pattern of a substrate and not giving constraint to the design of a pattern The component-side product of a substrate is not reduced and the airstream kinesis of a building envelope offers the high, high electromagnetic wave shielding plate of heat dissipation nature further. Further It is in offering the electromagnetic wave shielding plate which enabled restoration of the resin to a building envelope, and offering the electronic unit which therefore carried the electromagnetic wave shielding plate which raised dependability and packaging density.

[0013] Furthermore, it is in preventing formation of an electronic-circuitry [plate / electromagnetic wave shielding] substrate front-face [at insertion mounting or the time of carrying out a surface mount], and solder [in / specifically / the damage on a contact side with an electromagnetic wave shielding plate, or that between an electromagnetic wave shielding plate and a pattern] bridge, and offering the electronic unit carrying the electromagnetic wave shielding plate which therefore raised dependability more on an electronic-circuitry substrate.

[0014]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, it sets in claim 1 term. In the electronic unit equipped with the electronic-circuitry substrate carrying the electromagnetic wave shielding plate which shields the electromagnetic wave sent out from electronic parts and said electronic parts Form the slit section in the wall surface of said electromagnetic wave shielding plate, and the foot linked to said electronic-circuitry substrate is formed in the lower limit of said wall surface. Furthermore, around the connection which said foot connects, while forming the gap section which the part except said foot is cut and lacked [section] and passes the circuit pattern of said electronic-circuitry substrate, it constituted so that silk printing might be performed.

[0015] While forming the slit section in the wall surface of an electromagnetic wave shielding plate, forming the foot linked to an electronic-circuitry substrate in the lower limit of a wall surface and forming the gap section which the part except a foot is cut and lacked [section] and passes the circuit pattern of said electronic-circuitry substrate further Since it constituted so that silk printing might be performed to the perimeter of the connection which a foot connects While not interfering with the pattern of a substrate, the component-side product of a substrate is not reduced. Furthermore, the airstream kinesis of a building envelope can offer the high, high electromagnetic wave shielding plate of heat dissipation nature, and, therefore, can raise the dependability and packaging density of an electronic unit which carried the electromagnetic wave shielding plate.

[0016] Furthermore, formation of the electronic-circuitry [plate / electromagnetic wave shielding] substrate front-face [at insertion mounting or the time of carrying out a surface mount] and solder-specifically bridge between the damage on a contact side with an electromagnetic wave shielding plate or an electromagnetic wave shielding plate, and a pattern can be prevented on an electronic-circuitry substrate.

[0017] Moreover, in claim 2 term, said connection was constituted so that it might be the through hole where said foot is inserted.

[0018] A connection can raise further the dependability of a configuration and the unit which therefore carried the electromagnetic wave shielding plate by the ability certainly carrying an electromagnetic wave shielding plate, without causing a location gap on an electronic-circuitry substrate, since it constituted so that insertion mounting of the electromagnetic wave shielding plate might be more roughly carried out on an electronic-circuitry substrate so that it may be the through hole where a foot is inserted.

[0019] Moreover, in claim 3 term, said connection was constituted so that it might be the pad with which said foot is mounted.

[0020] A connection can raise further the dependability of a configuration and the unit which therefore carried the electromagnetic wave shielding plate by the ability certainly carrying an electromagnetic wave shielding plate on an

electronic-circuitry substrate with a simpler configuration, while being able to raise the packaging density of an electronic-circuitry substrate, since it constituted more roughly so that the surface mount of the electromagnetic wave shielding plate might be carried out on an electronic-circuitry substrate so that it may be the pad with which a foot is mounted.

[0021] Moreover, in claim 4 term, when [of said slit section and the gap section] any they are carried out the mold of said electronic-circuitry substrate in one with resin at least, it constituted so that it might become the input for making said resin flow into the interior of said electromagnetic wave shielding plate.

[0022] Since the slit section and/or the gap section were constituted so that it might consider as the input for making resin flow also into the interior of an electromagnetic wave shielding plate when they carried out the mold of the electronic-circuitry substrate in one with resin That is, since restoration of resin was enabled in the building envelope of an electromagnetic wave shielding plate, the vibration resistance of the lead section of electronic parts and oxidation resistance can be raised, and the dependability of the unit which therefore carried the electromagnetic wave shielding plate can be raised further.

[0023]

[Embodiment of the Invention] The electronic unit which carried hereafter the electromagnetic wave shielding plate applied to the gestalt of one example of this invention with reference to drawing 5 from drawing 1 is explained.

[0024] Drawing 1 is the perspective view specifically showing the electronic unit carrying the electromagnetic wave shielding plate concerning the gestalt of one operation of this invention, the substrate carrying electronic parts, and the electronic unit equipped with the electromagnetic wave shielding plate. In drawing, a sign 10 shows an electromagnetic wave shielding plate (only henceforth a "shielding plate"), and rather than the electronic parts mentioned later, the shielding plate 10 with which press working of sheet metal etc. comes to carry out a metal plate turns one, and is formed in box-like [of a big top-surface-view abbreviation rectangle].

[0025] Here, while explaining an electromagnetic wave shielding plate among the electronic units equipped with the electromagnetic wave shielding plate first applied to the gestalt of one operation of this invention with reference to drawing 2 and drawing 3 before continuing explanation of drawing 1, the installation to the substrate of an electromagnetic wave shielding plate is explained.

[0026] Drawing 2 is the perspective view showing an electromagnetic wave shielding plate among the electronic units equipped with the electromagnetic wave shielding plate concerning the gestalt of one operation of this invention.

[0027] The gap section 12 cut and lacked according to the pattern which mentions the part later is formed in the side-attachment-wall side lower limit of the shielding plate 10. Moreover, the foot 14 of a side-attachment-wall side lower limit which supports the shielding plate 10 protrudes on a substrate (after-mentioned) suitably in a location at a vertical-axis lower part. Furthermore, similarly the heights 16 which insert and engage with the through hole (after-mentioned) drilled in the lower limit of the predetermined foot 14 by the substrate protrude on a vertical-axis lower part.

[0028] Moreover, the slit section 18 which has predetermined width of face is formed in each corner of the shielding plate 10 ranging from the upper limit to a lower limit of a side-attachment-wall side. The side elevation which saw similarly the side elevation which saw the shielding plate 10 from [of drawing 2] arrow-head a to drawing 3 (a) from arrow-head b to drawing 3 (b) again is shown.

[0029] Subsequently, with reference to drawing 4, installation of a up to [the substrate of a substrate and the above-mentioned shielding plate 10] is explained. As shown in this drawing, the electronic parts 22, such as CPU, are carried in the electronic-circuitry substrate (only henceforth a "substrate") 20. Two or more connect with electronic parts 22, and a pattern (circuit pattern) 24 is connected to other electronic parts (not shown) etc. at them.

[0030] The through hole 26 where the above mentioned heights 16 are inserted is drilled in the predetermined location of a substrate 20. In addition, insertion mounting of the shielding plate 10 is carried out at a substrate 20 by making the configuration of a through hole 26 into the shape of heights 16 and abbreviation isomorphism, inserting heights 16 in a through hole 26, and therefore, being engaged like illustration.

[0031] Moreover, the silk printing section 28 is formed in the perimeter of a through hole 26 according to the configuration of a foot 14 (printing).

[0032] If it returns to explanation of drawing 1, the shielding plate 10 will be supported by the foot 14 so that he can understand from this drawing. Moreover, when the clearance according to a pattern 24 is formed between the shielding plate 10 and a substrate 20 of the gap section 12 and a pattern 24 passes through the clearance, a pattern 24 and the shielding plate 10 do not interfere. For this reason, it is not necessary to drill the through hole for a pattern detour, and constraint is not given to the design of a pattern. Therefore, packaging density can be made high while being able to prevent the fall of a component-side product.

[0033] Moreover, since the front face of the shielding plate 10 and the substrate 20 which specifically contacts a foot 14 is protected by the silk printing section 28, the front face of a substrate 20 is not damaged. In addition, the silk printing section 28 also plays a role of marking which shows the location which should mount the shielding plate 10.

[0034] Furthermore, since it flows out outside while air flows into the building envelope of the shielding plate 10 through the slit section 18, it is hard to accumulate the heat of the electronic parts 22 carried in the interior of the shielding plate 10. If it puts in another way, heat dissipation nature can be raised.

[0035] Subsequently, the mold by the resin of the substrate 20 in which the shielding plate 10 and electronic parts 22 were carried with reference to drawing 5 is explained.

[0036] Resin 32 is poured in while holding the substrate 20 with which the shielding plate 10 and electronic parts 22 (not shown) were mounted in a case 30, as shown in this drawing. Resin 32 flows into the building envelope of the shielding plate 10 through the slit section 18 and the gap section 12 in that case. In addition, since the slit section 18 is formed ranging from the upper limit to a lower limit of a shielding plate side-attachment-wall side as mentioned above, it fills up with resin 32 without a clearance to the building envelope upper limit of the shielding plate 10.

[0037] Therefore, the resin mold of the electronic parts 22 carried in the building envelope of the shielding plate 10 and the substrate 20 can be carried out in one without a clearance, and the vibration resistance of the lead section of electronic parts 22 and the solder section (not shown [both]) and oxidation resistance can be raised effectively.

[0038] Like the above, a pattern 24 and the shielding plate 10 do not interfere in the electronic unit carrying the electromagnetic wave shielding plate concerning the gestalt of one operation of this invention. Moreover, constraint is not given to the design of a pattern. Therefore, packaging density can be made high while being able to prevent the fall of a component-side product.

[0039] Moreover, the front face of a substrate 20 is not damaged. Furthermore, since marking of the location which should mount the shielding plate 10 is carried out, a mounting activity becomes easy.

[0040] Furthermore, it is hard to accumulate the heat of the electronic parts 22 carried in the interior of the shielding plate 10. If it puts in another way, heat dissipation nature can be raised.

[0041] Furthermore, since resin 32 can be made to flow that there is no clearance between the electronic parts 22 and the substrates 20 which were carried in the building envelope of the shielding plate 10 in case resin mold is carried out, the resin mold of electronic parts 22 and the substrate 20 can be carried out in one, and, therefore, the vibration resistance of the lead section of electronic parts 22 and oxidation resistance can be raised effectively.

[0042] Subsequently, with reference to drawing 6 and 7, the electronic unit carrying the electromagnetic wave shielding plate concerning the gestalt of operation of the 2nd of this invention is explained.

[0043] In drawing 6 , a sign 40 shows the electromagnetic wave shielding plate concerning the gestalt of operation of the 2nd of this invention. If a focus is set and explained to difference with the above-mentioned shielding plate 10, the shielding plate 40 does not have the above mentioned heights 16. Moreover, the pad 42 with which cream solder was applied is arranged instead of drilling a through hole 26 in a contact side with a foot 14 and a substrate 20, as shown in drawing 7 R> 7.

[0044] That is, as shown in this drawing, when a foot 14 is laid on a pad 42 and carries out a reflow further, the surface mount of the shielding plate 40 is carried out on a substrate 20. While being able to acquire the operation effectiveness mentioned above with the thereby more simple configuration, the packaging density of a substrate 20 can be raised. Moreover, the cream solder (not shown) dissolved by the reflow stops at the silk printing section 28, and, therefore, a solder bridge is not formed between the shielding plate 40 and a pattern 24. Furthermore, dependability (reinforcement) reservation of a foot etc. can become unnecessary and, therefore, can raise the dependability of an electronic unit further.

[0045] In addition, since it does not have the above-mentioned shielding plate 10 and an above-mentioned difference at all about a residual configuration, the same sign is attached and explanation is omitted.

[0046] Thus, if it is in the gestalt of one operation of this invention, and the gestalt of the 2nd operation In the electronic unit equipped with the electronic-circuitry substrate 20 carrying the electromagnetic wave shielding plate 10 (40) which shields the electromagnetic wave sent out from electronic parts 22 and said electronic parts 22 The slit section 18 is formed in the wall surface of said electromagnetic wave shielding plate 10 (40). While forming the foot 14 linked to said electronic-circuitry substrate in the lower limit of said wall surface and forming the gap section 12 which the part except said foot 14 is cut and lacked [section], and passes the circuit pattern of said electronic-circuitry substrate further Around the connection (a through hole 26, pad 42) linked to said foot 14, it constituted so that silk printing (silk printing section 28) might be performed.

[0047] Moreover, said connection was constituted so that it might be the through hole 26 where said foot 14 is inserted.

[0048] Moreover, said connection was constituted so that it might be the pad 42 with which said foot 14 is mounted.

[0049] Moreover, at least, said slit section 18, the gap section 12, and when either carried out the mold of said electronic-circuitry substrate 20 in one with resin 32, it constituted so that it might become the input for making said resin 32 flow into the interior of said electromagnetic wave shielding plate 10 (40).

[0050] In addition, in the gestalt of this operation, although the configuration of the electromagnetic wave shielding plate 10 (40) was made into the abbreviation rectangle, according to the configuration of the electronic parts which are not restricted to this and carried in a building envelope, it is good as various configurations.

[0051] Moreover, a pattern 24 may be introduced into the building envelope of the shielding plate 10 (40) by passing the slit section 18.

[0052]

[Effect of the Invention] If it is in invention given in claim 1 term, while not interfering with the pattern of a substrate, the component-side product of a substrate is not reduced, and further, the airstream kinesis of a building envelope can offer the high, high electromagnetic wave shielding plate of heat dissipation nature, and, therefore, can raise the dependability and packaging density of an electronic unit which carried the electromagnetic wave shielding plate.

[0053] Furthermore, formation of an electronic-circuitry [plate / electromagnetic wave shielding] substrate front-face [at insertion mounting or the time of carrying out a surface mount] and solder [in / specifically / the damage on a contact side with an electromagnetic wave shielding plate or that between an electromagnetic wave shielding plate and a pattern] bridge can be prevented on an electronic-circuitry substrate.

[0054] If it is in invention given in claim dyadic, an electromagnetic wave shielding plate can certainly be carried, without causing a location gap on an electronic-circuitry substrate, and, therefore, the dependability of the unit which carried the electromagnetic wave shielding plate can be raised further.

[0055] If it is in invention given in claim 3 term, while being able to raise the packaging density of an electronic-circuitry substrate, an electromagnetic wave shielding plate can certainly be carried on an electronic-circuitry substrate with a simpler configuration, and, therefore, the dependability of the unit which carried the electromagnetic wave shielding plate can be raised further.

[0056] If it was in invention given in claim 4 term, since restoration of resin was enabled in the building envelope of an electromagnetic wave shielding plate, the vibration resistance of the lead section of electronic parts and oxidation resistance can be raised, and the dependability of the unit which therefore carried the electromagnetic wave shielding plate can be raised further.

[Translation done.]